

# PFC Program 5year Planning Activity

- Committee: J. Brooks, T. Rognlien, D. Ruzic, M. Ulrickson, C. Wong, S. Luckhardt (chair)
- Charge: Develop draft 5year roadmap for US PFC/PMI Program. Components of plan: Base PMI science, ALPS Program, ITER PMI/PFC R&D
- Schedule: Complete Draft Document 3 3/31. Report progress at monthly PFC conference calls.

## Program Elements 5YR plan (input needed)

- Basic PMI Science: Formulate statement of science mission. Physics of material/plasma interface. Experiments/modeling topics: physics of sputtering/erosion, material deposition and mixing ,atomic and molecular processes at boundary, ...
- US ALPS Program: NSTX Module A,B, Alternative (non-lithium) liquids, development of flowing liquid options,...
- ITER R&D: PMI studies of Be,C,W. Hydrogen isotope inventory, ELM simulator experiments, US modeling needs, ...
- External constraints: NSTX schedule, ITER schedule
- Deliverables: Expected results, New codes, ...

# 5-Yr Vision for PMI Modeling

(J.N. Brooks)

- Integrated, predictive, plasma/material interaction ‘Super-Code’ computations.
- Super-code = Plasma SOL/Edge codes + Surface response codes + Impurity erosion/redeposition code. Real-time fully coupled. Run time < 24 hrs/problem.
- Plasma codes: Fluid (UEDGE\*) + Kinetic (as needed) + Neutral (DEGAS) + Sheath (B-PHI).
- Surface response codes: sputtering, reflection, etc. via binary collision (TRIM/ITMC) and molecular dynamics code.
- Erosion/redeposition code: REDEP/WBC full kinetic, sub-gyro orbit.
- Desirable for super-code runs on PC, however, within 5-yrs would probably need supercomputer implementation.
- Example problems: Erosion/tritium-codeposition performance of a carbon divertor with complete carbon/hydrocarbon self-consistent transport. Lithium divertor performance with induced low-recycle plasma edge regime.

\* for all codes, code shown or equivalent